



## Features

- Two channel quadrature output
- Bushing or servo mount
- Square wave signal
- Small size
- Resolution to 256 PPR
- CMOS and TTL compatible
- Long life
- Ball bearing option for high operating speed up to 3000 rpm
- RoHS compliant\*

## EN - Rotary Optical Encoder

### General Information

The Bourns® EN model is a self-contained rotary optical encoder. It produces a 2-bit quadrature signal which is suitable for digital systems where both magnitude and direction of adjustment must be provided. The EN encoder is ideal for use as a digital panel control or as a position sensing device in applications where long life, reliability, high resolution and precise linearity are critical.

The EN series encoder converts rotary input into electrical signals which can be used by microprocessors without A/D conversion.

Bourns encoder output signals are square wave digital pulses which do not require debounce circuitry. Both features make it possible to significantly reduce the memory overhead, wiring and wiring interconnects required by other types of control devices.

EN optical encoders offer a useful rotational life of from 10 million to 200 million shaft revolutions, making them ideal for extended service applications. The Bourns encoder is also compact and well suited for situations where the available space is limited.

### Additional Information

Click these links for more information:



[PRODUCT](#) [TECHNICAL LIBRARY](#) [INVENTORY](#) [SAMPLES](#) [CONTACT](#)

### Electrical Characteristics

Output.....	2-bit quadrature code, Channel A leads Channel B by 90 ° (electrical) with clockwise rotation
Resolution.....	25 to 256 cycles per revolution
Insulation Resistance (500 VDC) .....	1,000 megohms
Electrical Travel .....	Continuous
Supply Voltage.....	5.0 VDC ±0.25 VDC
Supply Current.....	.26 mA maximum
Output Voltage	
Low Output .....	0.8 V maximum
High Output.....	4 V minimum
Output Current	
Low Output .....	25 mA minimum
Rise/Fall Time.....	200 ns (typical)**
Shaft RPM (Ball Bearing) .....	3,000 rpm maximum
Power Consumption .....	136 mW maximum
Pulse Width (Electrical Degrees, Each Channel) .....	180 ° ±45 ° typ.
Pulse Width (Index Channel).....	360 ° ±90 °
Phase (Electrical Degrees, Channel A to Channel B).....	90 ° ±45 ° typ.

### Environmental Characteristics

Operating Temperature Range .....	-40 °C to +75 °C (-40 °F to +167 °F)
Storage Temperature Range .....	-40 °C to +85 °C (-40 °F to +185 °F)
Humidity.....	MIL-STD-202, Method 103B, Condition B
Vibration .....	5 G
Shock.....	50 G
Rotational Life	
A & C Bushings (300 rpm maximum)*** .....	10,000,000 revolutions
W, S & T Bushings (3,000 rpm maximum)*** .....	200,000,000 revolutions
IP Rating.....	IP 40

\*\* See schematic note page 2

\*\*\*For resolutions ≤ 128 quadrature cycles per shaft revolution.

**BOURNS®**

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### WARNING

#### Cancer and Reproductive Harm

[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

\*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

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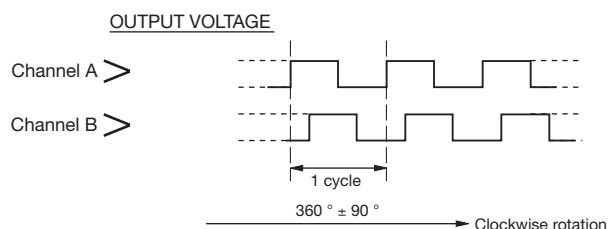


## **EN – Rotary Optical Encoder**

**BOURNS®**

## Mechanical Characteristics

## Quadrature Output Table



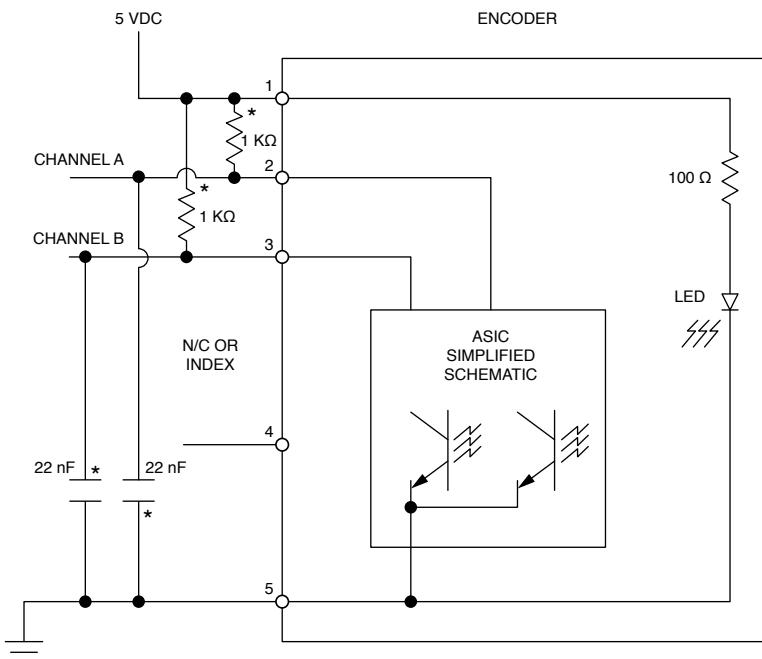
#### **STANDARD RESOLUTIONS AVAILABLE**

(Full quadrature output cycles per shaft revolution)	
25*	125
50*	128
64	200
100	256

For Non-Standard Resolutions—Consult Factory

\* Channel B leads Channel A

## 14 mm Optical Encoder Electrical Diagram



\*External pull-up resistors (1K ohms) and filter caps (22 nF) recommended for proper operation. Utilization of a filter circuit will yield a typical rise time of 50 microseconds. See schematic.

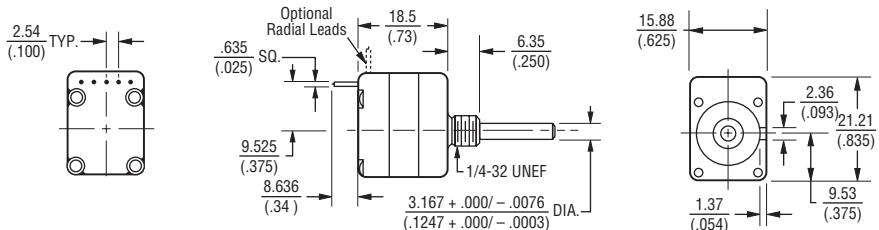
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# EN – Rotary Optical Encoder

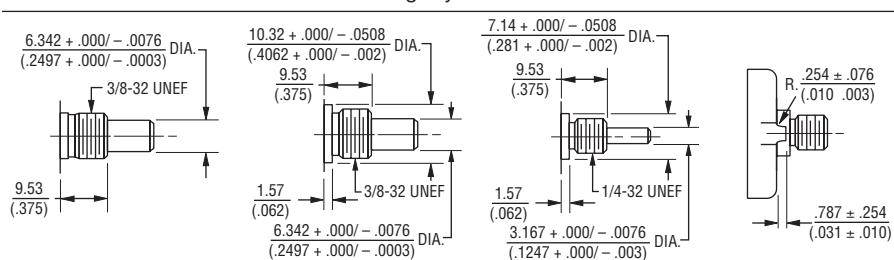
**BOURNS®**

## Dimensional Drawings



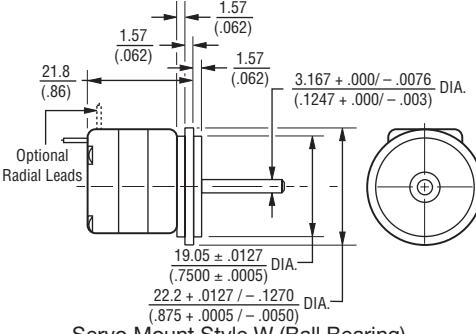
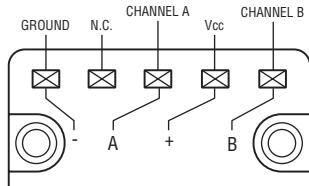
Consult factory for options not shown, including:

- Wire lead or cable options
- Connectors
- Non-standard resolutions
- Special shaft/bushing sizes and features
- Special performance characteristics
- PCB mounting bracket

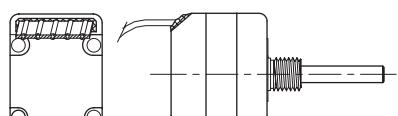
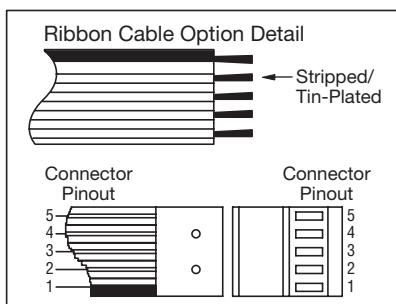
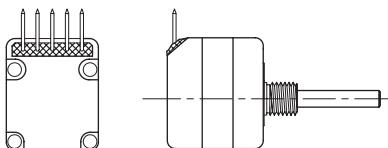
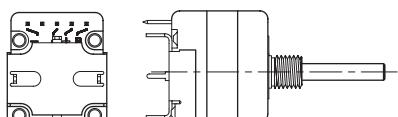
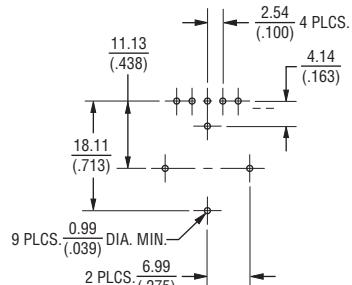


SHAFT LENGTH	SHAFT FLAT LENGTH (DIM. F)
12.7 (.050)	2.54 (.100)
15.9 (.0625)	5.08 (.200)
19.1 (.0750)	8.25 (.325)
22.2 (.0875)	9.65 (.380)

## TERMINATION DIAGRAM



## Shaft End Style C



DIMENSIONS: MM  
(INCHES)

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